40205

SUBJ: SPECTRON MEETING NOTES BETWEEN R. SANCHEZ & RF WESTON INC

3/6/02

6 March 2002 ~1:00 – 4:00 Draft Meeting Notes and Follow Up Costing

Attendees: Rob Sanchez, Tom Cornuet, and Dave Pohl (end of meeting)

Discussion Topics

1. **Discussed Ohio and Virginia HRC In Situ Bioremediation (ISB) projects.**

2. **Discussed responses to Robs questions listed in his 27 February 2002 Letter. The questions and responses are provided below.**

   a. Will HRC be effective on the type of contaminants at the site?
      Yes, on dissolved phase. It would also increase rate of DNAPL dissolution. The difficult issue is the unknown amount of VOC mass present at the site.

   b. Are the concentrations of contaminants too high for HRC to work effectively to reduce contamination?
      Available literature indicates probably not.

   c. Are there other treatments that are better suited than HRC for the contaminants at Spectron?
      Others that should be considered:
      - *ISB with sodium lactate.*
      - *Chemical oxidation.*
      - *Steam injection or surfactant flushing.*

   d. Are the conditions (I.E., permeability, etc.) at Spectron favorable to use of HRC or other treatments?
      The combination of fractured rock and DNAPL makes the conditions complex but does not necessarily preclude the use of in situ remediation technologies for source mass reduction. However, the remediation objective should not be to meet a specific groundwater concentration, which may not be an attainable goal at this site.

   e. Should HRC be applied through many vertical wells at highly contaminated areas, or should a broader site-wide application through horizontal wells be used? Which is most cost effective?
      Horizontal wells installed into the fractured metamorphic bedrock at this site would be difficult and expensive. HRC has been applied with vertical wells, vertical direct-push, and horizontal direct-push methods. The best approach for HRC application at this site would probably be using vertical open-hole wells installed at highly contaminated areas with pressurized packer injection of HRC into the bedrock (Earth Data, Inc. has experience with this). If shallow overburden groundwater treatment were needed, direct-push injection HRC application focused in highly contaminated areas where the saturated overburden is thickest would probably be the best approach.

f. Can a horizontal well be placed at the top of the low permeability layer?
Probably not realistically.

g. Will the contaminants in the vadose zone be impacted if HRC is used? Does HRC create a biological biosparge effect, which may require collection of off gases from the vadose zone?
No. No.

3. **Discussed summary of notes from last meeting 13 February 2002, highlights are shown below:**
   a. Unsaturated soil remediation is difficult to conduct using in situ methods due to several reasons. An engineered permeable cap with focused soil removal was recommended.

   b. Disadvantages of conducting horizontal well biosparging in the shallow groundwater were discussed.

   c. The highly contaminated bedrock groundwater discharges upward into the shallow groundwater. This minimizes the benefits gained from shallow groundwater remediation efforts conducted before the bedrock groundwater contamination is addressed. Therefore groundwater remediation efforts would be most effective targeted in the bedrock groundwater rather than in the shallow unconsolidated soil groundwater. Much progress has been made in the remediation of highly contaminated aquifers that contain DNAPL. Remediation technologies that should be considered for this site include:
      i. In Situ Chemical Oxidation using peroxide, magnesium peroxide or some other effective oxidizer.
      ii. In Situ Anaerobic Reductive Dechlorination Bioremediation using HRC, sodium lactate, or some other effective electron donor.
      iii. Chemical Reduction using Bimetallic Nanoscale Particles (BNP).
      iv. Steam or Surfactant injection.

   d. Suggested components of the Onsite Soil and Shallow Groundwater ROD included the followng:
      i. Engineered permeable cap
      ii. Localized soil hot spot excavation
      iii. Containment system monitoring program upgrade
      iv. Include language stating the bedrock is the major source of contamination and site risk and needs to be addressed beyond the current containment system.

4. **Discussed potential remediation technologies for the bedrock groundwater and provided Rob with pertinent references and vendor information.**

5. **Discussed the EPA and WESTON budget status and need for additional authorization.**

6. **Discussed the need for conceptual level costing for HRC remediation for the site. Conceptual costing for bedrock and shallow groundwater HRC application was conducted after the meeting. Costing assumptions are summarized below and the Regenesis, Inc. HRC costing sheet is attached.**

   a. Shallow Groundwater Conceptual Costing Assumptions:
      i. 75 ft x 150 ft area in thicker highly contaminated portion of the site between G-7 and MW-11
      ii. Three HRC geoprobe applications conducted over 5 years
      iii. Saturated thickness/treatment interval = 15 ft (~5 to 25 ft bgs)
      iv. Hydraulic conductivity = 1 ft/day
      v. Porosity = 0.2
      vi. Groundwater gradient = 0.035
      vii. Concentrations: PCE, TCE, 1,1,1-TCA, and methylene chloride=1% solubility
      viii. Objective is mass reduction and assumes no recontamination from bedrock
         - **~$150,000 per application**
         - **~$450,000 for three applications over 5 years**

   b. Bedrock Groundwater Conceptual Costing Assumptions:
      i. 75 ft x 225 ft area in the highly contaminated portion of the site along the creek and upgradient of G-39 and VW-2
      ii. Three HRC pressure packer injection applications conducted in 9 bedrock wells over 5 years
      iii. Saturated thickness/treatment interval = 45 ft (~30 to 75 ft bgs)
      iv. Hydraulic conductivity = 0.3 ft/day
      v. Porosity = 0.05
      vi. Groundwater gradient = 0.01
      vii. Concentrations: PCE, TCE, 1,1,1-TCA = 10%, methylene chloride=5% solubility
      viii. Objective is mass reduction
         - **~$80,000 design and well installation**
         - **~$170,000 per application**
         - **~$590,000 for design, installation, and three applications over 5 years**

   c. Additional notes:
      i. These are conceptual costs for one remediation technology. Other remediation approaches and a more thorough evaluation of this approach should be conducted.
      ii. Highly contaminated groundwater discharges up into the shallow overburden groundwater, which minimizes the benefit gained from conducting shallow groundwater remediation before the bedrock groundwater contamination is addressed.
      iii. The SPECTRON site is highly contaminated with dissolved phase and DNAPL contamination in saturated overburden and fractured bedrock. The combination of fractured rock and DNAPL makes the conditions complex but does not necessarily preclude the use of in situ remediation technologies for source mass reduction. However, the remediation objective should not be to meet a specific groundwater concentration, which may not be an attainable goal at this site.